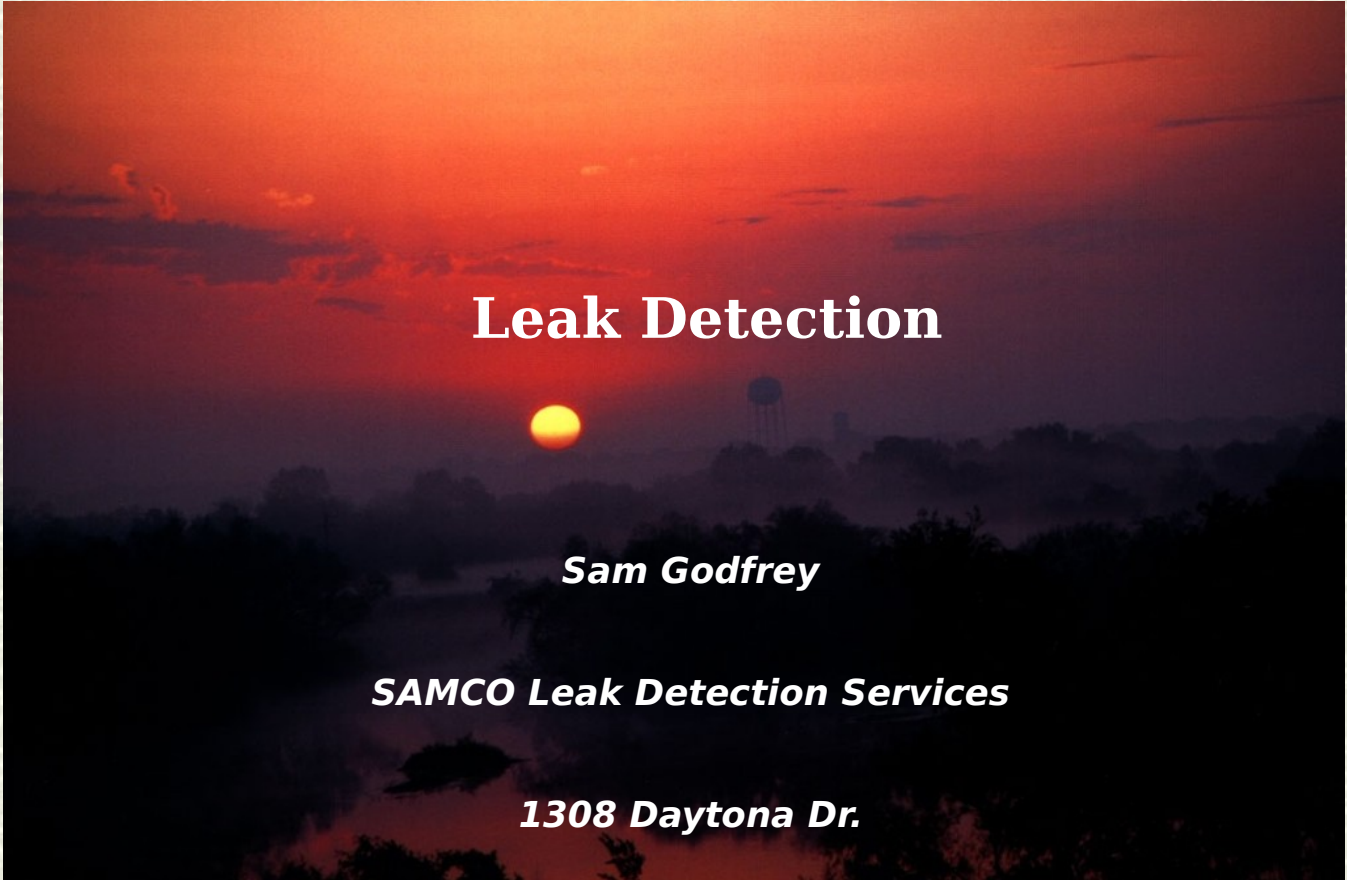


Introduction



Leak Detection

Sam Godfrey

SAMCO Leak Detection Services

1308 Daytona Dr.

Austin, TX 78733

Total System Audit

- ▮ Identifies unaccounted for water and value of that water loss.

Procedures for Conducting a Leak Detection Water Audit

- Account for all water produced
 - Test all large meters (water well, water plant or interconnect meters)
 - Perform customer meter assessment
 - Audit accountability records
-

Water Source Meter Testing



- ▮ Inspect proper meter selections
- ▮ Inspect for proper meter installations
- ▮ Perform annual large meter test

Source Meters

- Replace residential customer meters after 10 years of service or one million gallons of usage
- Meter change out programs are essential in receiving proper revenues



Water Tank Overflows

- Inspect overflow outlets
- Identify and eliminate overflows



System Flushing

- All water should be accounted for when flushing



Flow Testing

- Flow testing equipment will accurately measure all water flushed from water system



Fire Hydrant Identification

- Identifying the fire hydrant or flush valve by number, color, or metal tag during pre flow testing will allow measurement of water flushed from system

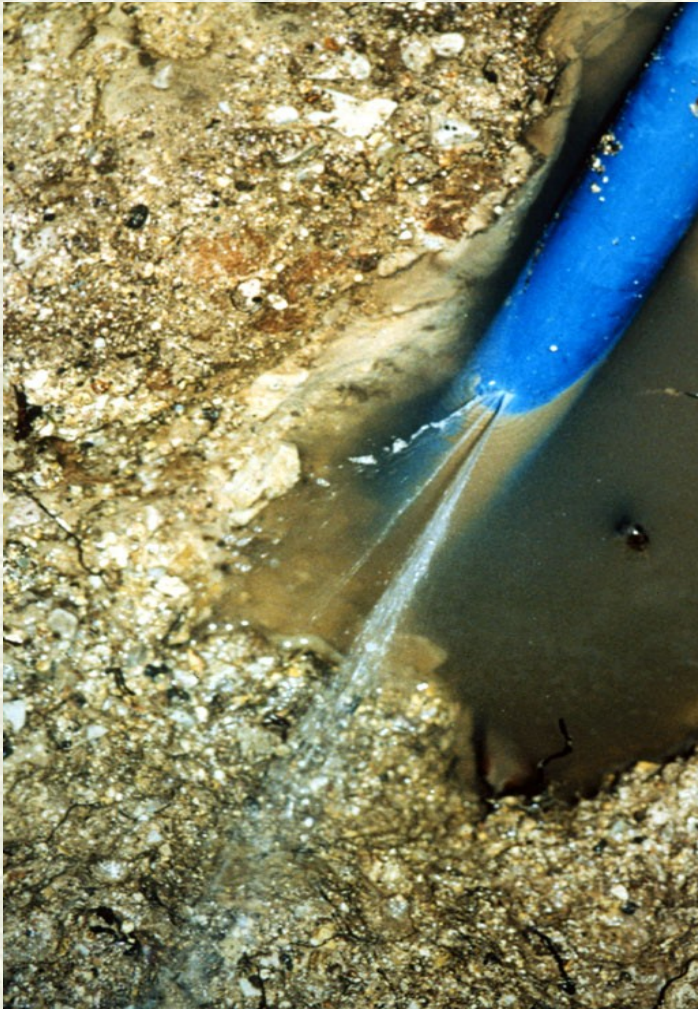


Acoustic Survey

- ▮ Acoustic sounding will identify unaccounted for water loss.
- ▮ Acoustic leak detection requires:
 - ▮ Quality equipment.
 - ▮ Experienced field technician well versed in identifying specific leak sounds.
 - ▮ Confidence in making decisions concerning exact leak locations for excavations



Acoustic Leak Detection Equipment



- The benefits of listening with acoustic survey equipment at all service connections, valves and fire hydrants or flush valves.
- ≈ Allows identification of leak sounds on plastic pipe material that does not resonate sound well.

Porous Soil Conditions



- Granite gravel allowed these leaks to flow through the porous soil and not surface. Leaks were identified with acoustic survey equipment.

Long Term Leakage

- The root growth is strong due to the long term moisture received from the leak.



Long Term Leakage



- A long term leak can drain not only your water system, but liquid revenues



Rural & Remote Leak Detection



- A few procedures to identify leaks in remote areas of a water system are:
 - ⚡ Walking & visually inspecting water lines in remote areas.
 - Performing chlorine residual test on standing water that appears to be unusual.
 - Investigate green vegetation such as cattails, willows, and unusual vegetation near water lines.

Common Sense Conservation



- ▢ Green vegetation and cattails during hot, dry summer conditions are indicators that moisture is present. The following problems were identified with this leak scenario:
 - ▢ 2" irrigation meter was not registering leak flow - revenue loss
 - ▢ Utility was in 3rd stage of water rationing - improve conservation procedures and delay early water rationing
 - ▢ Located at entrance of Walmart- public conservation awareness

Cross Connection and Water Theft



- ▢ The flush valve was identified in a rural area during a leak project. The following problems were identified:
 - ▢ Cross connection
 - ▢ Lack of system awareness
 - ▢ Large water theft & revenue loss

Cross Connection and



Preventative Maintenance Leak Detection



- Leak Detection will identify leaks and allow repairs to be made to prevent the following:
 - ⚡ Emergency leak repair situations
 - Reduce unnecessary operating costs
 - Protect public health
 - Reduce water losses and increase revenues

Are you prepared for Drought Conditions?



Are you prepared for Drought Conditions?



Unaccounted For Water Assessment Checklist

Is a water audit performed?

Is all water metered? (Account for all water)

Do you have an active meter calibration or meter change out program?

Are meters properly installed and sized?

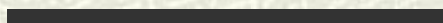
Have check valves been inspected for reverse flow @ wells/intakes?

Do Overflows occur @ storage tanks?

What type of preventative maintenance programs are in effect?



Questions & Answers





samco-leakservice.com

sgodfrey@samco-leakservice.com

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